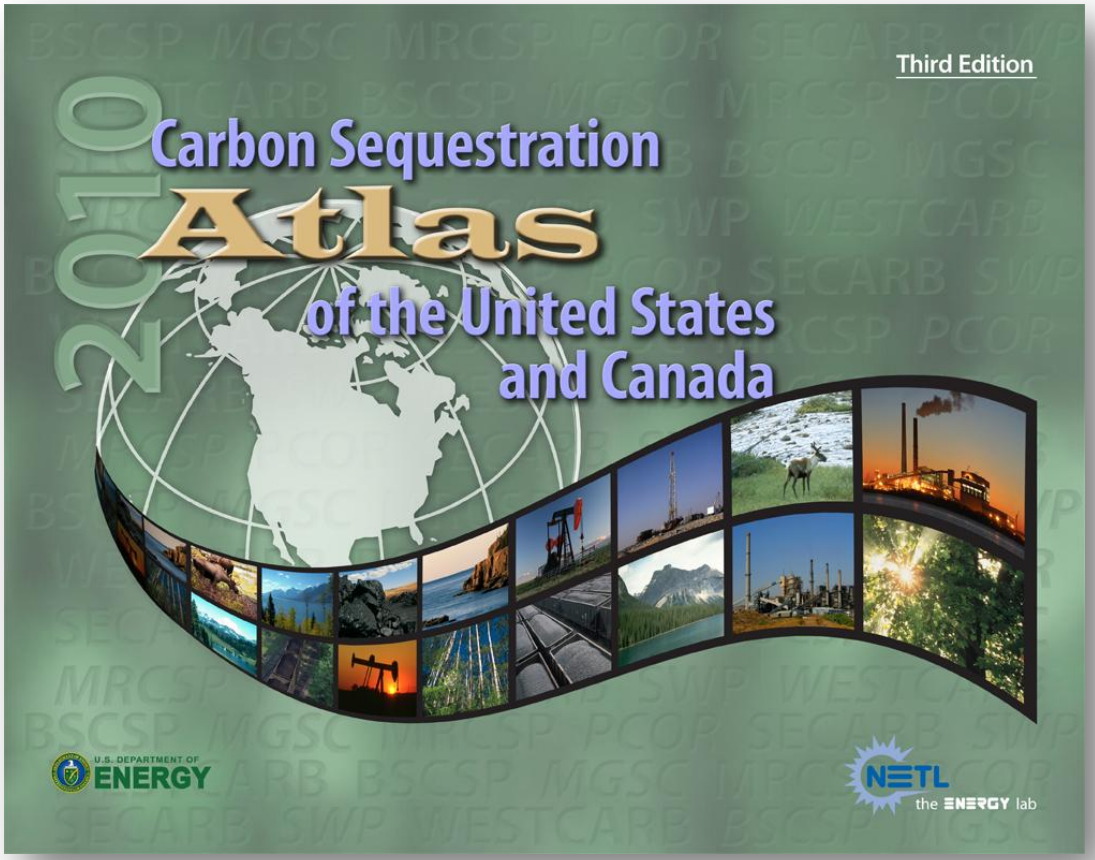


2010 Carbon Sequestration Atlas of the United States and Canada

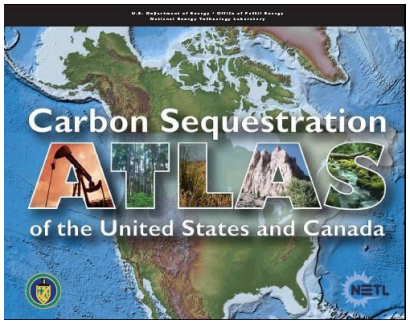
Dawn Deel, Project Manager, Sequestration Division

October 5, 2010

U.S. DEPARTMENT OF ENERGY

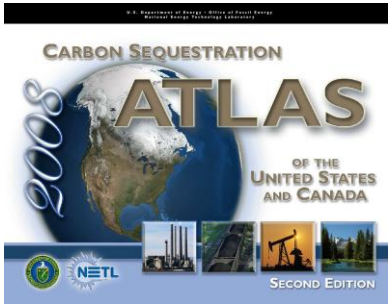
Background and Statistics

Atlas I - March 2007



- First coordinated assessment of CCS in the US and Canada
- Provided maps showing number, location and magnitude of CO_2 sources
- Maps showing areal extent of geologic storage sites
- Storage potential by Partnership
- Digital Atlas developed
- Over 3,000 hardcopies released: 1,000 CDs mailed
- Daily downloads from NETL website

Atlas II - November 2008



- Updated the CO_2 storage portfolio
- Documented differences in CO_2 resource and CO_2 capacity
- Provided CO_2 emission estimation for stationary sources
- Described Interagency collaboration
- Illustrated federal lands CO_2 geologic storage potential
- Discussed CO_2 pipeline infrastructure
- Provided state CO_2 geologic storage potential
- Digital Atlas updated
- Over 1,500 hardcopies released: 500 CDs mailed
- Daily downloads from NETL website

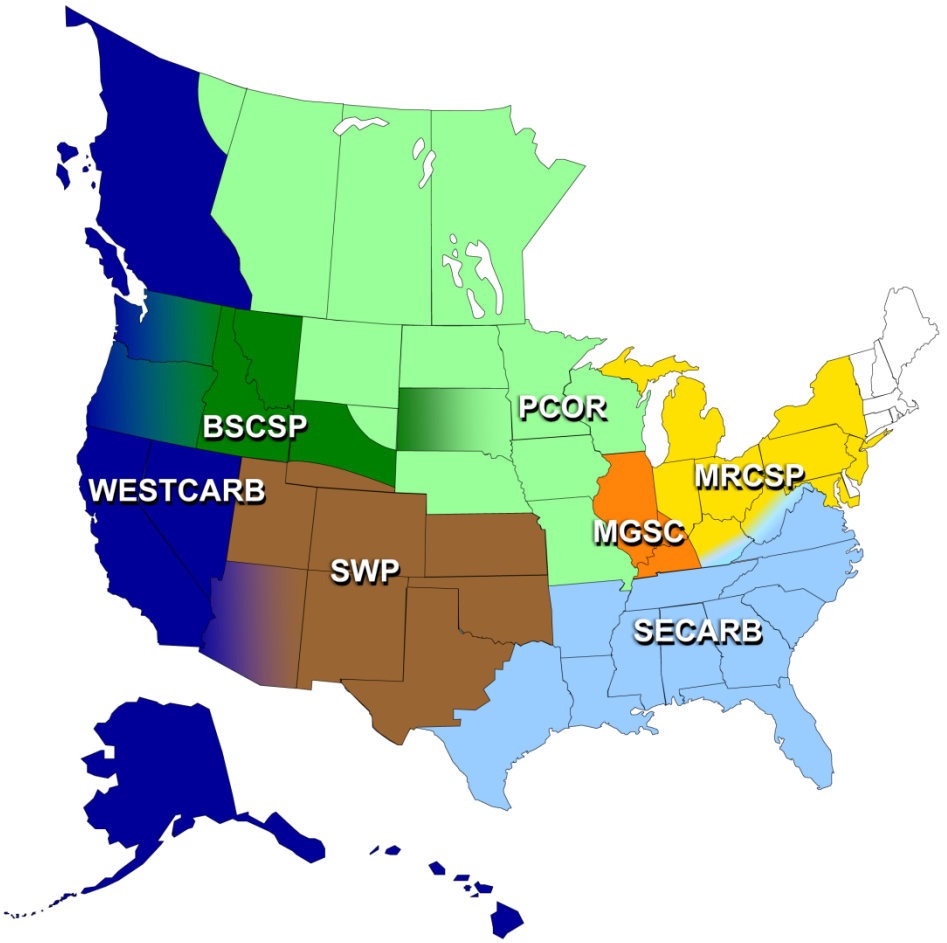
Atlas III

- **Scheduled for release in November 2010**

- **Featuring updates on:**
  - DOE's Carbon Sequestration Program
  - DOE's International Collaborations
  - DOE's ORD and National Risk Assessment Program
  - Regional Carbon Sequestration Partnership Activities
  - Updated CO_2 Stationary Source Estimates
  - Refined Methodology for Calculating Geologic Storage Potential
  - Updated CO_2 Storage Resource potential
  - Worldwide CCS projects
  - ARRA Activities
  - NATCARB's improved databases and GIS system

Atlas III
General Outline

- **Introduction Section**
- **National Section**
- **Regional Perspectives**
  - BSCSP
  - MRCSP
  - MGSC
  - PCOR
  - SECARB
  - SWP
  - WESTCARB
- **Appendices**

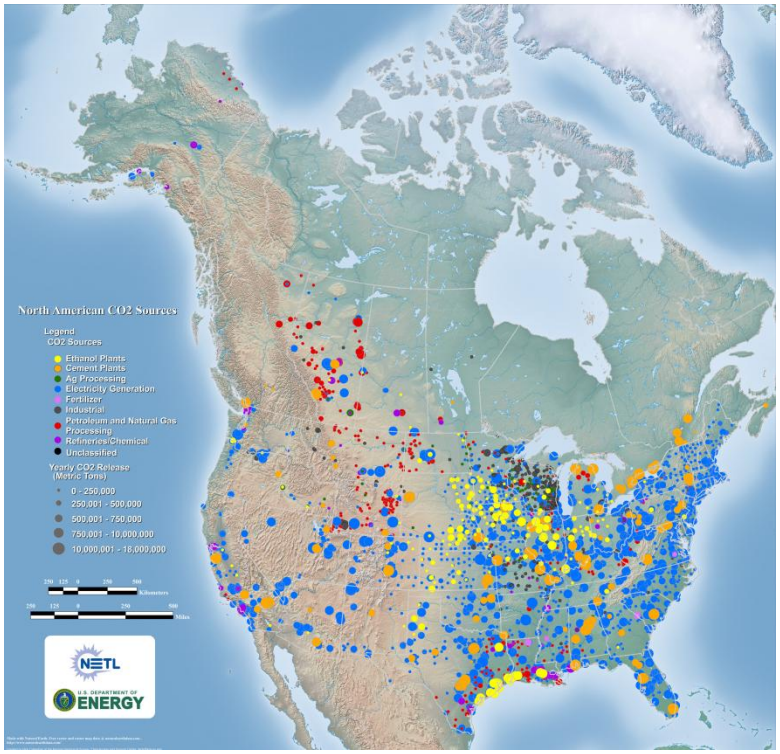


Atlas III
Introduction Section

- The Greenhouse Gas Effect
- A Technology Approach to Reduce GHG Emissions
- What is Carbon Sequestration?
- DOE's Carbon Sequestration Program
- Regional Carbon Sequestration Partnerships
- DOE CCS Best Practice Manuals
- Global Collaborations
- Interagency Collaborations
- Site Characterization
- Depositional Environments
- ARRA of 2009
- NETL's CCS Worldwide Database
- Public Outreach
- North American Carbon Atlas Partnership
- NATCARB

Atlas III
National Perspectives Section

- **CO_2 Stationary Source Emissions Summary**
- **Storage Resource Methodology Overview**
- **Maps and Discussion on:**
  - CO_2 Stationary Sources
  - Sedimentary Basins
  - Saline Formations
  - Oil/Gas Reservoirs
  - Unmineable Coal Seams
  - Basalts
  - Organic-Rich Shales
  - Federal Lands



Atlas III

Regional Perspectives Section

- Regional Carbon Sequestration Partnership Introduction
- Regional CO_2 stationary sources map & emission estimates
- Regional CO_2 storage resource maps & estimates for oil and gas reservoirs, saline formations, and coal seams (basalts and shales – if available)
- RCSP terrestrial pilot results
- RCSP Phase II field tests
- RCSP Phase III field tests
- Integrating CCS into community
- Contacts

Atlas III - Appendices

- **A: Methodologies Used to Estimate CO_2 Stationary Source Emissions**
- **B: Methodology for Development of Geologic Storage Estimates for CO_2**
- **C: State Estimates of CO_2 Resource Potential**

Availability

- **Hardcopies at Carbon Sequestration Conference or by mail**
- **Downloads from NETL Internet**

- **Updated every 2 years**

2010 Schedule

- **Methodology**
  - April 30 — Draft complete
  - June 14 — Out for 1st round of peer review
  - October 1 — Out for 2nd round of peer review
  - November 30 — Published online

- **Atlas**
  - May 3 — Introduction Section draft complete
  - June 30 — National Section draft complete
  - September 20 — Partnership Sections drafts complete
  - October 1 — Atlas III draft out for comment
  - November 30 — Published online

NATIONAL ENERGY TECHNOLOGY LABORATORY

DOE Revised Methodology for Development of Geologic Storage Potential for CO_2 Storage

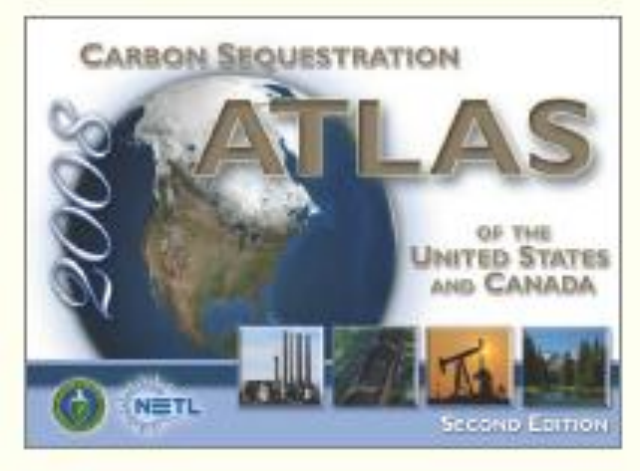
Doug Allen[d], Grant Bromhal[a], Dawn Deel [a], Jim Fazio[e], Scott Frailey [b], Angela Goodman[a,], George Guthrie[a], Alexandra Hakala[a], Nick Huerta[a], Barbara Kutchko[a], Dustin McIntyre[a], Traci Rodosta[a], Vyacheslav Romanov[a], Mitchell Small[c]

[a]United States Department of Energy, National Energy Technology Laboratory, P.O. Box 10940, Pittsburgh, Pennsylvania 15236 / P.O. Box 880, Morgantown, WV 26507
[b]Illinois State Geologic Survey, Midwest Geological Sequestration Consortium
[c]Carnegie Mellon University, Civil and Environmental Engineering & Engineering and Public Policy
[d]Salem State College, Geological Sciences
[e]United States Department of Energy, National Energy Technology Laboratory (ORISE)

October 5, 2010

U.S. DEPARTMENT OF ENERGY

Purpose of the DOE CO_2 Storage Methodology



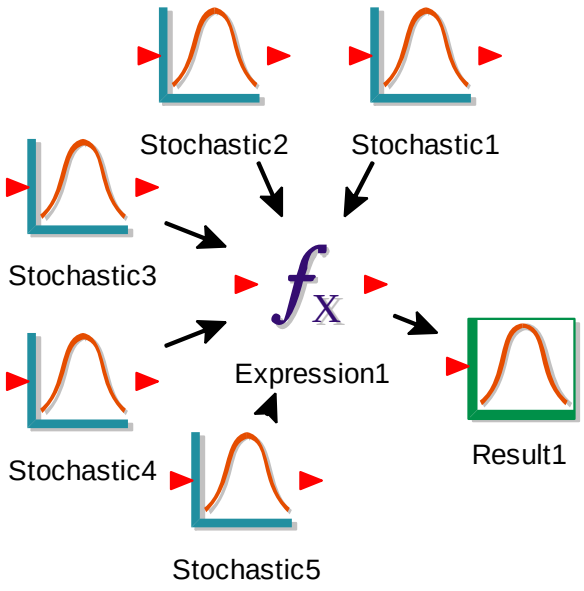
- High-level assessments of potential CO_2 storage reservoirs in the United States and Canada at the regional and national scale.
- Three types of geologic formations: oil and gas reservoirs, saline formations, and unmineable coal seams
- Based on physically accessible pore volume without consideration of regulatory or economic constraints.
- Used for broad energy-related government policy and business decisions
- Methodology is intended for external users such as the RCSPs, future project developers, and governmental entities
- Distributed online by a geographic information system in NATCARB and made available as hard-copy in the *Carbon Sequestration Atlas of the United States and Canada*

Main Revisions to Methodology

– Defined boundary conditions for CO_2 storage resource estimates

– Updated efficiency factors for saline formations and unmineable coal seams with improved stochastic method and documented parameters for saline formations (reporting P_{10}, P_{50}, and P_{90})

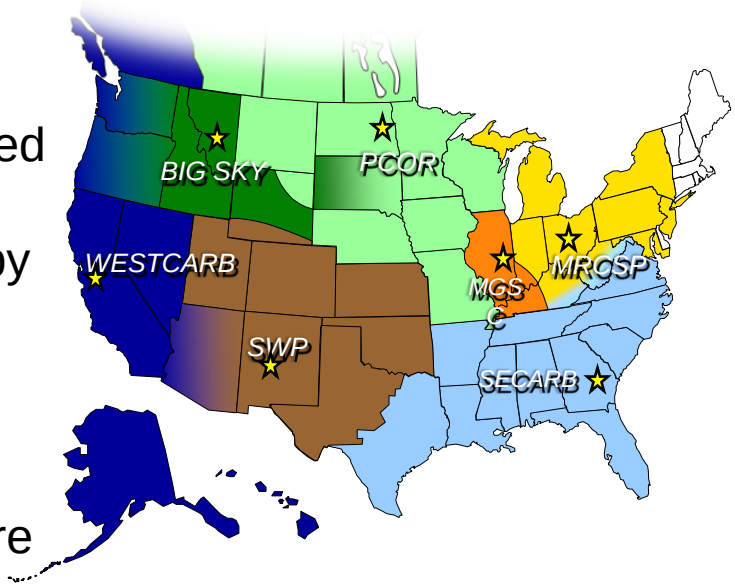
- Based on a combination of data (with varying quality) and expert judgment, the P_{10} and P_{90} limits can be interpreted as subjective probabilities.



Definitions of CO_2 Estimates

CO_2 Storage Resource Estimates

- Available pore volume of a given formation that is accessible to CO_2 injected through drilled and completed wellbores
- Only physical trapping of CO_2 is considered
- Assumption that *in-situ* fluids will either be displaced by the injected CO_2 into distant parts of the same formation or neighboring formations or managed by means of fluid production, treatment, and disposal



CO_2 Storage Capacity Estimates

- Represent the geologic storage potential when current economic and regulatory considerations are included.
- DOE's methodology does not provide CO_2 storage capacity estimates as these detailed, site-specific estimates require a higher level of analysis than regional and national scale CO_2 storage resource estimates

Definitions of CO_2 Estimates

Boundary Conditions

Open

- Permeable fluid-filled reservoirs where *in-situ* fluids will either be displaced away from the injection location or managed

Closed

- Fluid-filled reservoirs where *in-situ* fluid movement is restricted by means of impermeable barriers.

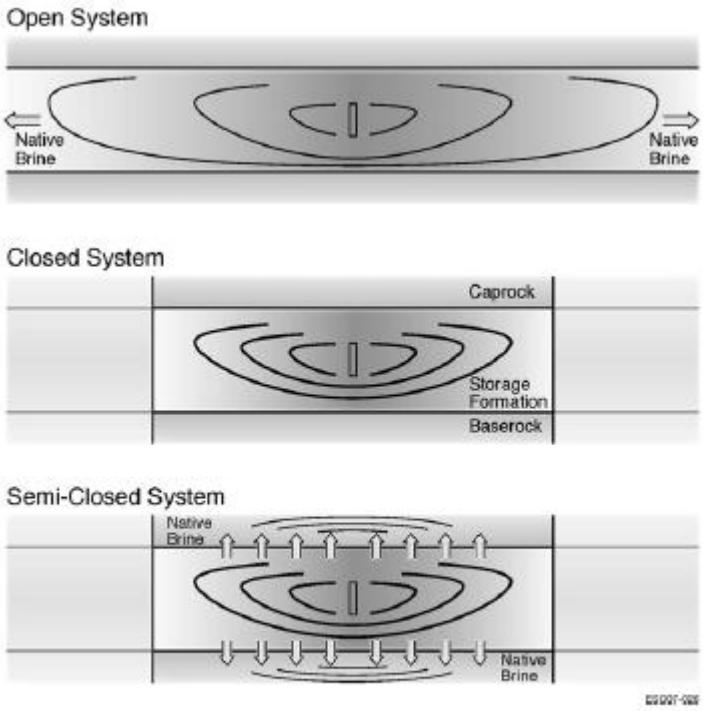
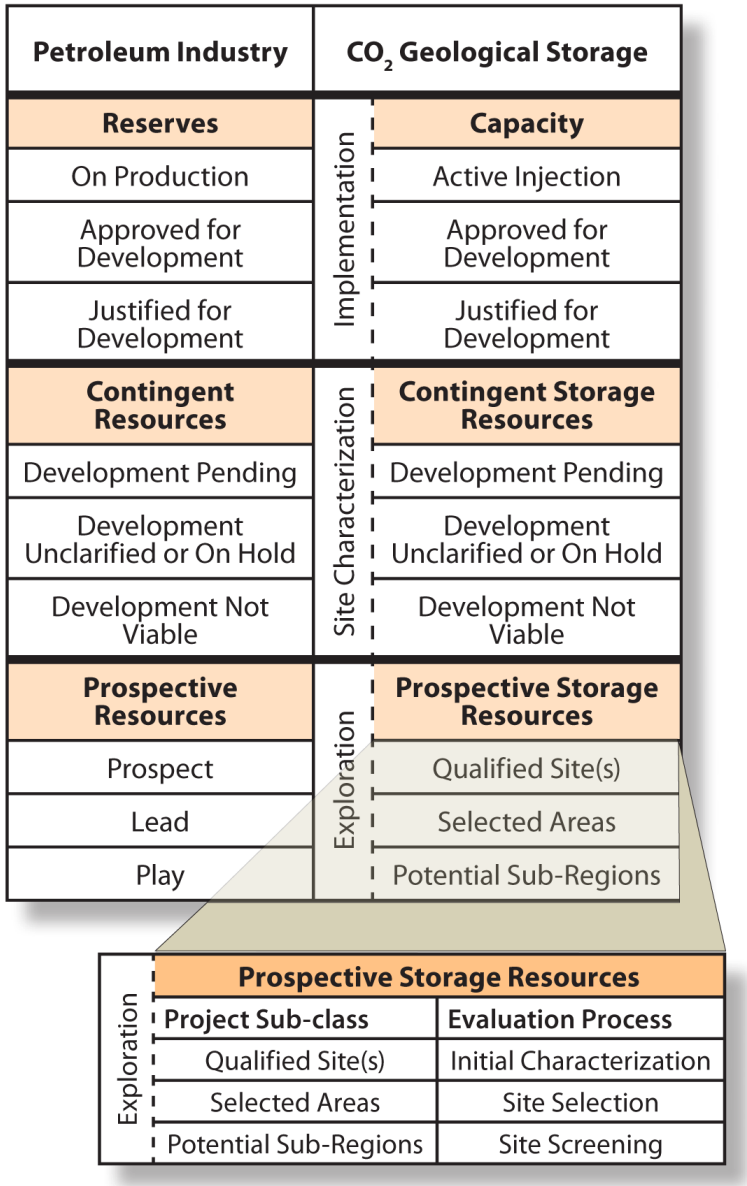


Fig. 1 – Schematic showing open systems vs. closed or semi-closed systems (not to scale).

CO_2 storage resource estimates provide an upper boundary for CO_2 storage (Realization of the full CO_2 storage resource estimate as a capacity estimate will rely on how site-specific geology, economics, and regulations restrict management of in-situ fluids)

CO_2 Storage Classification

- Current DOE resource assessments are in the Prospective Storage Resource class
- As Site Specific Estimates become available, they will be classified as Contingent
- When future Commercial Projects are active, assessments will be in the Storage Capacity class



CO_2 Storage Resource Method

Volumetric Approach

- *Oil and Gas Reservoir CO_2 Storage Resource Estimates*

$$G_{CO2} = \underbrace{A\ h_n\ \phi_e}_{\text{total pore volume}}\ \underbrace{(1-S_w)B\ \rho}_{\text{fluid properties}}\ \underbrace{E}_{\text{efficiency}}$$

- *Saline Formation CO_2 Storage Resource Estimates*

$$G_{CO2} = A_t\ h_g\ \phi_{tot}\ \rho E_{saline}$$

- *Unmineable Coal Seam CO_2 Storage Resource Estimates*

$$G_{CO2} = A\ h_g\ C_s\ \rho_{s,max}\ E_{coal}$$

Hundreds of Years of Storage Potential

2008 North American CO_2 Storage Potential(Giga Tons)

Sink Type	Low	High
Saline Formations	3300	13000
Unmineable Coal Seams	160	180
Oil and Gas Fields	140	140

Conservative Resource Assessment

Efficiency Factor for Saline Formations

$$E_{saline} = E_{An/At}\, E_{hn/hg}\, E_{\phi e/\phi tot}\, E_V\, E_d$$

% of volume that is amenable to CO_2 sequestration | *effective CO_2 plume shape* | *accessible pore volume*

Term	Symbol	P_{10}/P_{90} Values by Lithology			Description
		Clastics	Dolomite	Limestone	
Geologic terms used to define the entire basin or region pore volume					
Net-to-Total Area	$E_{An/At}$	0.2/0.8	0.2/0.8	0.2/0.8	Fraction of total basin or region area with a suitable formation.
Net-to-Gross Thickness	$E_{hn/hg}$	0.21/0.76*	0.17/0.68*	0.13/0.62*	Fraction of total geologic unit that meets minimum porosity and permeability requirements for injection.
Effective-to-Total Porosity	$E_{\phi e/\phi tot}$	0.64/0.77*	0.53/0.71*	0.64/0.75*	Fraction of total porosity that is effective, i.e., interconnected.
Displacement terms used to define the pore volume immediately surrounding a single well CO_2 injector.					
Volumetric Displacement Efficiency	E_V	0.16/0.39*	0.26/0.43*	0.33/0.57*	Combined fraction of immediate volume surrounding an injection well that can be contacted by CO_2 and fraction of net thickness that is contacted by CO_2 as a consequence of the density difference between CO_2 and in-situ water.
Microscopic Displacement Efficiency	E_d	0.35/0.76*	0.57/0.64*	0.27/0.42*	Fraction of pore space unavailable due to immobile *in-situ* fluids.

*Values from Gorecki et al. (2009)

Log Odds Method when applied with Monte Carlo sampling

1. Transform ‘P’ values of a range into corresponding ‘X’ values of a range
2. Determine the mean and standard deviation of ‘X’
3. Run Monte Carlo sampling (GoldSim) using the mean and standard deviation using normal distributions with a sample size of 5000 iterations for each.

$$X = ln\left(\frac{P}{1-P}\right)$$

$$\sigma_X = \frac{X_{90} - X_{10}}{(Z_{90} - Z_{10})}$$

$$\mu_X = X_{10} - \sigma_X Z_{10}$$

$$E = \left(1/1 + e^{X(A)}\right)\left(1/1 + e^{X(h)}\right)\left(1/1 + e^{X(\varphi)}\right)\left(1/1 + e^{X(Ev)}\right)\left(1/1 + e^{X(Ed)}\right)$$

X_{10} and X_{90} Values Converted from P_{10} and P_{90} Values						
	Clastics		Dolomite		Limestone	
	X_{10}	X_{90}	X_{10}	X_{90}	X_{10}	X_{90}
$E_{An/At}$	-1.4	1.4	-1.4	1.4	-1.4	1.4
$E_{hn/hg}$	-1.32	1.15	-1.59	0.75	-1.90	0.49
$E_{\phi e/\phi tot}$	0.58	1.21	0.12	0.90	0.58	1.10
E_V	-1.66	-0.45	-1.05	-0.28	-0.71	0.28
E_d	-0.62	1.15	0.28	0.58	-0.99	-0.32

μ_X and σ_X Values Calculated from X_{10} and X_{90} Values						
	Clastics		Dolomite		Limestone	
	μ_X	σ_X	μ_X	σ_X	μ_X	σ_X
$E_{An/At}$	0	1.1	0	1.1	0	1.1
$E_{hn/hg}$	-0.09	0.97	-0.42	0.91	-0.71	0.93
$E_{\phi e/\phi tot}$	0.89	0.25	0.51	0.30	0.84	0.20
E_V	-1.05	0.47	-0.66	0.30	-0.21	0.39
E_d	0.27	0.69	0.43	0.11	-0.66	0.26

Saline Formation Efficiency Factors For Geologic and Displacement Terms $E_{saline} = E_{An/At}\, E_{hn/hg}\, E_{\phi e/\phi tot}\, E_V\, E_d$			
Lithology	P_{10}	P_{50}	P_{90}
Clastics	0.51%	2.0%	5.4%
Dolomite	0.64%	2.2%	5.5%
Limestone	0.40%	1.5%	4.1%

2010 Efficiency Factors for Saline Formations

Open Boundaries

Saline Formation Efficiency Factors For Geologic and Displacement Terms $E_{saline} = E_{An/At}\ E_{hn/hg}\ E_{\phi e/\phi tot}\ E_v\ E_d$			
Lithology	**P_{10}**	**P_{50}**	**P_{90}**
Clastics	0.51%	2.0%	5.4%
Dolomite	0.64%	2.2%	5.5%
Limestone	0.40%	1.5%	4.1%

Saline Formation Efficiency Factors For Displacement Terms $E_{saline}^{*} = E_v\ E_d$			
Lithology	**P_{10}**	**P_{50}**	**P_{90}**
Clastics	7.4%	14%	24%
Dolomite	16%	21%	26%
Limestone	10%	15%	21%

*$E_{An/At}$, $E_{hn/hg}$, and $E_{\phi e/\phi tot}$ values are known directly

Formation Scale Saline Formation Efficiency Factors $E_{saline} = E_{An/At}\ E_{hn/hg}\ E_{\phi e/\phi tot}\ E_v\ E_d$ $E_{An/At}$ and $E_{hn/hg}$ Terms Fixed at P_{50} Value						
	Numerical method[1]			Monte Carlo Method[2]		
Lithology	**P_{10}**	**P_{50}**	**P_{90}**	**P_{10}**	**P_{50}**	**P_{90}**
Clastics	1.86%	2.70%	6.00%	1.2%	2.4%	4.1%
Dolomite	2.58%	3.26%	5.54%	2.0%	2.7%	3.6%
Limestone	1.41%	2.04%	3.27%	1.3%	2.0%	2.8%
1. Gorecki et al. (2009) 2. this work						

2008 E factor:
1 and 4% (P_{15}-P_{85})

2008 CO2 Resource Estimates by Partnership		
	Saline Formations	
	Low	**High**
	Billion Metric Tons of CO_2	Billion Metric Tons of CO_2
Big Sky	460.9	1,831.5
MGSC	29.2	116.6
MRCSP	49.6	199.1
PCOR	185.6	185.6
SECARB	2,274.6	9,098.4
SWP	92.4	368.9
WESTCARB	204.5	818.2
Total	3,297.0	12,618.0

Closed Boundaries

E_{comp} 0.35 and 1% (Zhou, Birkholzer, Gorecki, Okwen, van de Meer, Economides)

2010 Efficiency Factors for Coal Seams

$$E_{coal} = E_{An/At}\, E_{hn/hg}\, E_A\, E_L\, E_g\, E_d$$

% of volume that is amenable to CO_2 sequestration — *effective CO_2 plume shape* — *accessible pore volume*

Term	Symbol	P_{10}/P_{90} Values	Description
Geologic terms used to define the entire basin or region pore volume			
Net-to-Total Area	$E_{An/At}$	0.6/0.8	Fraction of total basin or region area that has bulk coal present.
Net-to-Gross Thickness	$E_{hn/hg}$	0.75/0.90	Fraction of coal seam thickness that has adsorptive capability.
Displacement terms used to define the pore volume immediately surrounding a single well CO_2 injector.			
Areal Displacement Efficiency	E_A	0.7/0.95	Fraction of the immediate area surrounding an injection well that can be contacted by CO_2.
Vertical Displacement Efficiency	E_L	0.8/0.95	Fraction of the vertical cross section (thickness), with the volume defined by the area (A) that can be contacted by a single well.
Gravity	Eg	0.9/1.0*	Fraction of the net thickness that is contacted by CO_2 as a consequence of the density difference between CO_2 and the in-situ water in the cleats.
Microscopic Displacement Efficiency	E_d	0.75/0.95	Reflects the degree of saturation achievable for in-situ coal compared with the theoretical maximum predicted by the CO_2 Langmuir Isotherm.

*0.999999999999999 used due to inability to divide by zero when using Log Odds Method.

Coal Seam Efficiency Factors $E_{coal} = E_{An/At}\, E_{hn/hg}\, E_A\, E_L\, E_g\, E_d$		
P_{10}	**P_{50}**	**P_{90}**
21%	37%	48%

Coal Seam Efficiency Factors for Displacement Terms $E_{coal}^* = E_A\, E_L\, E_g\, E_d$		
P_{10}	**P_{50}**	**P_{90}**
39%	64%	77%

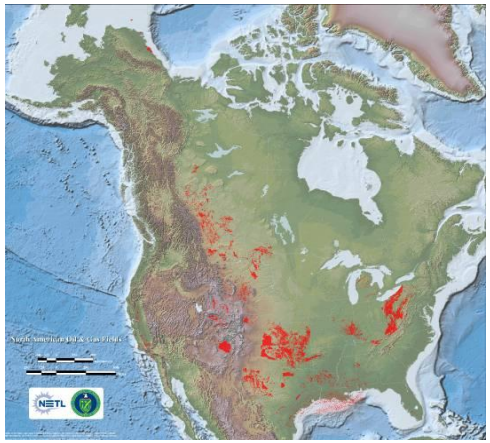
*$E_{An/At}$ and $E_{hn/hg}$ values known directly

2008 E factor:
28 and 40% (P_{15}-P_{85})

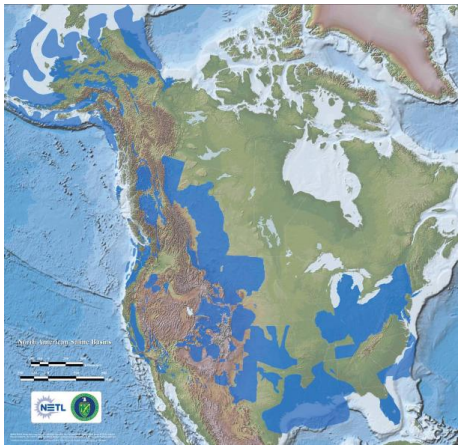
2008 CO2 Resource Estimates by Partnership		
	Unmineable Coal Seams	
	Low	**High**
	Billion Metric Tons of CO_2	Billion Metric Tons of CO_2
Big Sky	12.1	12.1
MGSC	1.7	2.4
MRCSP	0.8	0.8
PCOR	10.7	10.7
SECARB	43.8	63.0
SWP	0.7	1.8
WESTCARB	86.8	86.8
Total	157.0	178.0

Summary

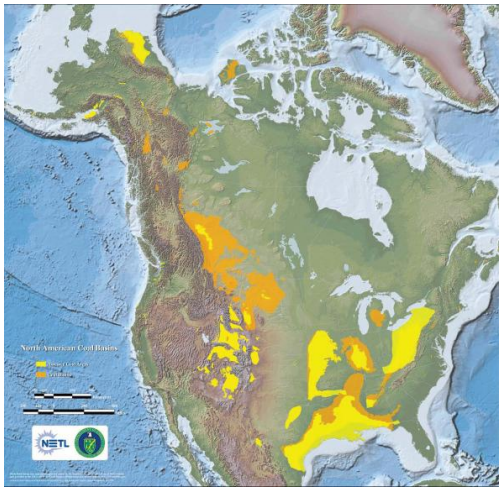
- Revise CO_2 storage resource methodology for November 2010 Carbon Sequestration Atlas
- Submit CO_2 storage resource methodology to peer-reviewed journal in October 2010
- ***Main Revisions to Methodology***:
  - Defined boundary conditions for CO_2 storage resource estimates
  - Updated efficiency factors for saline formations and unmineable coal seams with improved stochastic method and documented parameters for saline formations



Oil and Gas Fields



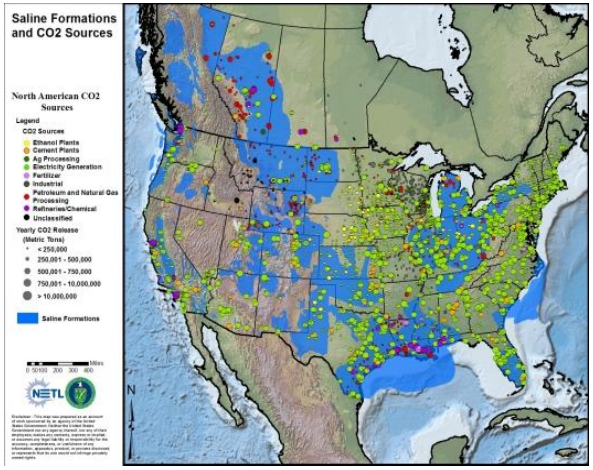
Saline Formations

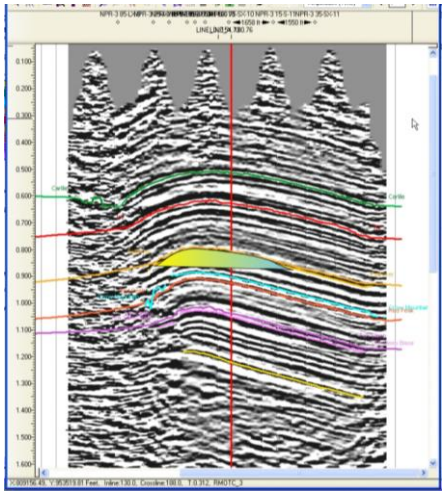


Unmineable Coal Seams

NATIONAL ENERGY TECHNOLOGY LABORATORY

NatCarb: National Carbon Sequestration Database and Geographic Information System





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Timothy R. Carr
Department of Geology and Geography, West Virginia University
NETL-RUA

U.S. DEPARTMENT OF ENERGY

October 5, 2010

Cast of Thousands

Site Map GO>

the ENERGY lab

Where energy challenges converge and energy solutions emerge

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  - Coal & Power Systems
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    - Monitoring, Verification, and Accounting
    - Simulation & Risk Assessment
    - CO_2 Use/Reuse
    - Regional Partnerships
    - Systems & Analysis
    - NatCarb
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Technologies
NatCarb

www.netl.doe.gov/natcarb

The National Carbon Sequestration Database and Geographic Information System (NatCarb) is a geographical information system (GIS)-based tool developed to provide a national view of carbon capture and storage (CCS) potential in the United States and Canada, and to provide all stakeholders with improved online tools for the display and analysis of CCS data.

NatCarb will provide CCS data both through user-friendly web tools such as Google Earth™ and Google Maps™, and through high-end GIS and database query tools. Maps and background information from the 2008 Carbon Sequestration Atlas of the United States and Canada are available as links in the navigation menu to the right, or as Adobe PDF files below. Interactive CO_2 sources and storage maps are provided below, along with a link to the experimental viewer.

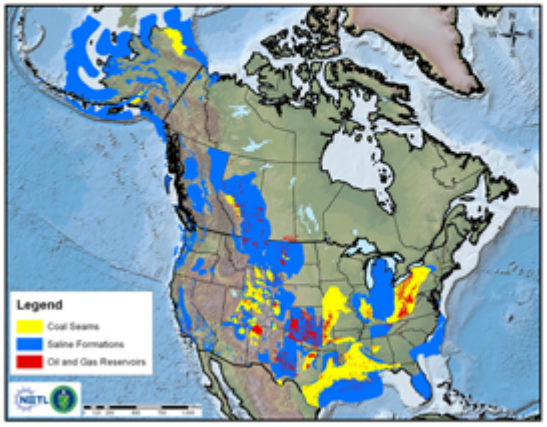
- Background
- CO_2 Sources
- CO_2 Storage
- Partnership Activities
- Methodologies
- Maps
- Downloads
- Contacts

- 2008 Carbon Sequestration Atlas II of the United States and Canada – Version 2
- Interactive CO_2 Sources Map
- Interactive CO_2 Storage Locations Map
- Experimental NatCarb Viewer

Announcements and Updates

- August 27, 2009 – Department of Energy Announces More than $8.4 Million for Regional Sequestration Technology Training Projects

CLICK ON GRAPHIC TO ENLARGE



Map of North American CO_2 Storage Locations.

www.netl.doe.gov/natcarb

Home > Technologies > Carbon Sequestration > *NatCarb*

Technologies
NatCarb

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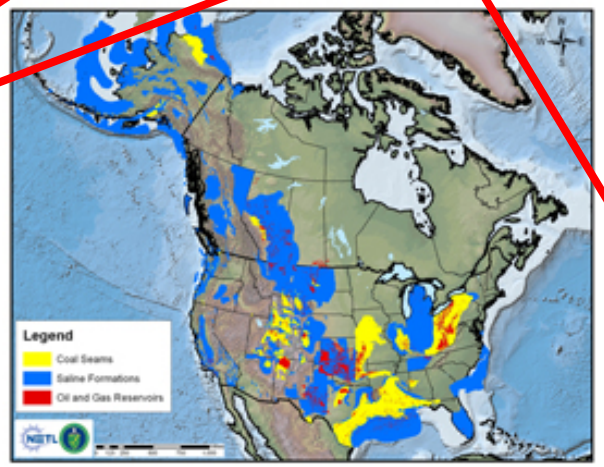
- Downloads
- Contacts

- 2008 Carbon Sequestration Atlas II of the United States and Canada – Version 2
- Interactive CO_2 Sources Map
- Interactive CO_2 Storage Locations Map
- Experimental NatCarb Viewer

Announcements and Updates

- August 27, 2009 – Department of Energy Announces More than $8.4 Million for Regional Sequestration Technology Training Projects

CLICK ON GRAPHIC TO ENLARGE



Map of North American CO_2 Storage Locations.

Links to PDF files from Atlas II

Google Maps style “point-and-click” maps based on RCSP data from Atlas II

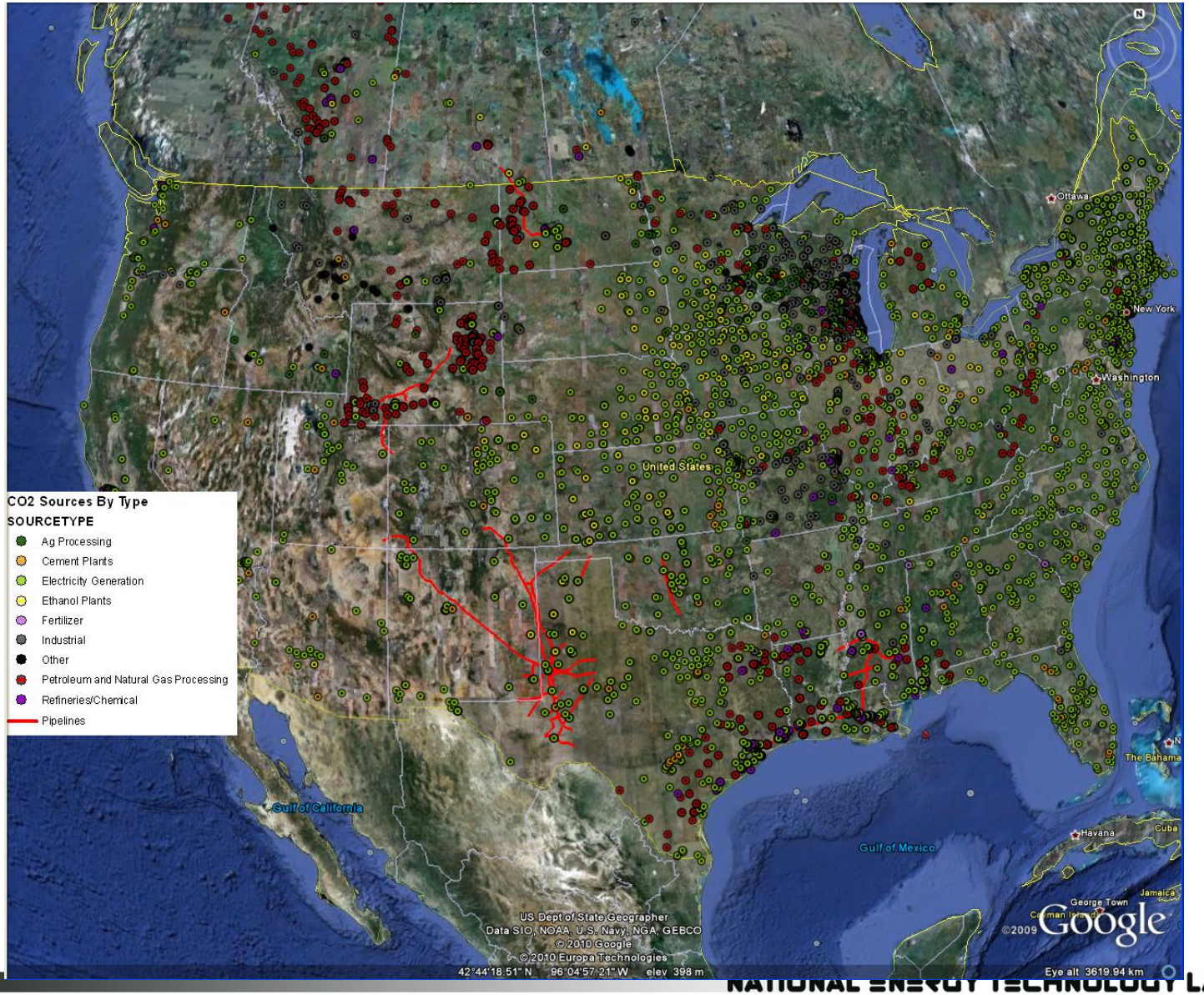
Interactive ArcIMS maps with RCSP Atlas II and NETL Brine Database Data (*New: ArcGIS Maps)*

Contain links to maps and the NETL Carbon Capture and Storage Database

Downloads of GIS data on CO_2 Sources and Saline, Coal, and Oil & Gas Storage Formations (RCSP data)
(*New: ArcGIS layer downloads)*

Map and Data Requests

Map requests: Simple map PDF files to complex KMZ files for Google Earth



KMZ file on CO_2 Sources and Pipelines requested by the Red Chalk Group (Corporate Consultants)

NETL Carbon Capture and Storage Database

- **Included as link from NatCarb webpage**
- **Example of how NatCarb serves as a central resource for investigators to access CCS data**

ABOUT NETL

KEY ISSUES & MANDATES

RESEARCH

TECHNOLOGIES

Oil & Natural Gas Supply

Coal & Power Systems

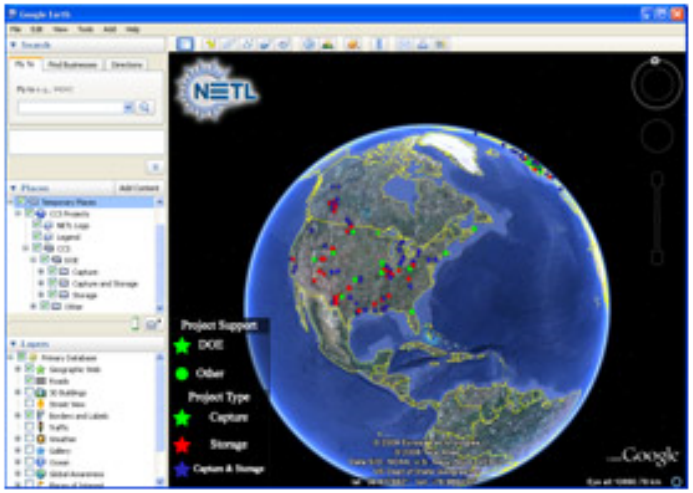
Carbon Sequestration

- Program Overview
- Capture
- Storage
- Monitoring, Verification, and Accounting
- Simulation & Risk Assessment
- CO_2 Use/Reuse
- Regional Partnerships
- Systems & Analysis

Carbon Sequestration

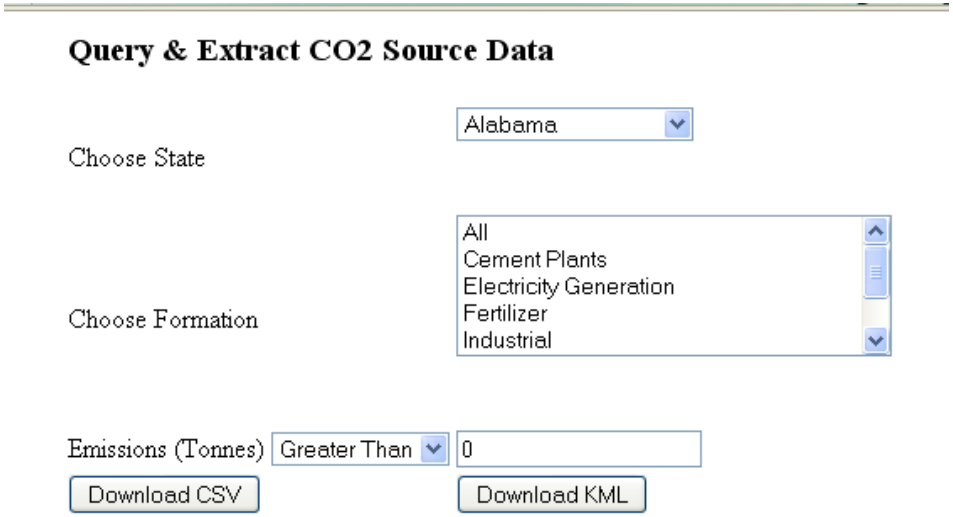
NETL Carbon Capture and Storage Database

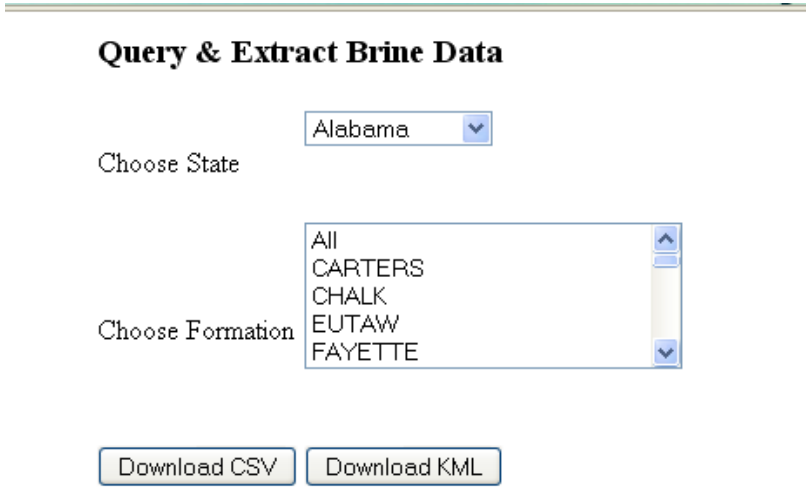
Welcome to the Carbon Capture and Storage database assembled by NETL. The database includes both active and proposed Carbon Capture and Storage (CCS) projects world-wide. Information in the database regarding technologies being developed for capture, evaluation of sites for sequestration of carbon dioxide (CO2), estimation of project costs and anticipated dates of completion for projects are sourced from publically available information. This database provides the public with information regarding efforts by various industries, public groups, and governments towards development and eventual deployment of CCS technology. This is an active database that will be updated as information regarding these or new projects are released to the public.



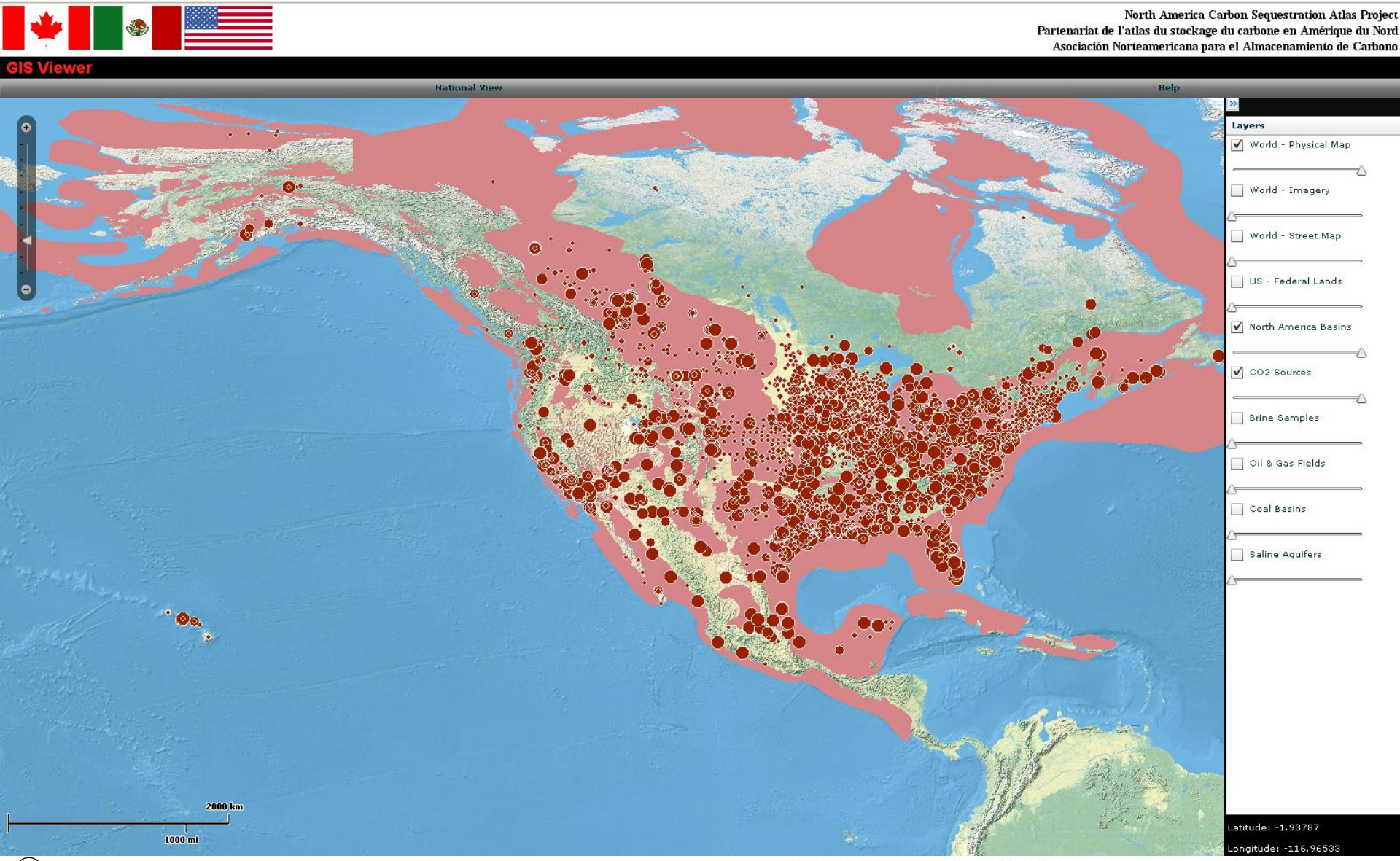
Carbon Capture and Storage Database Features

New Query and Download Features

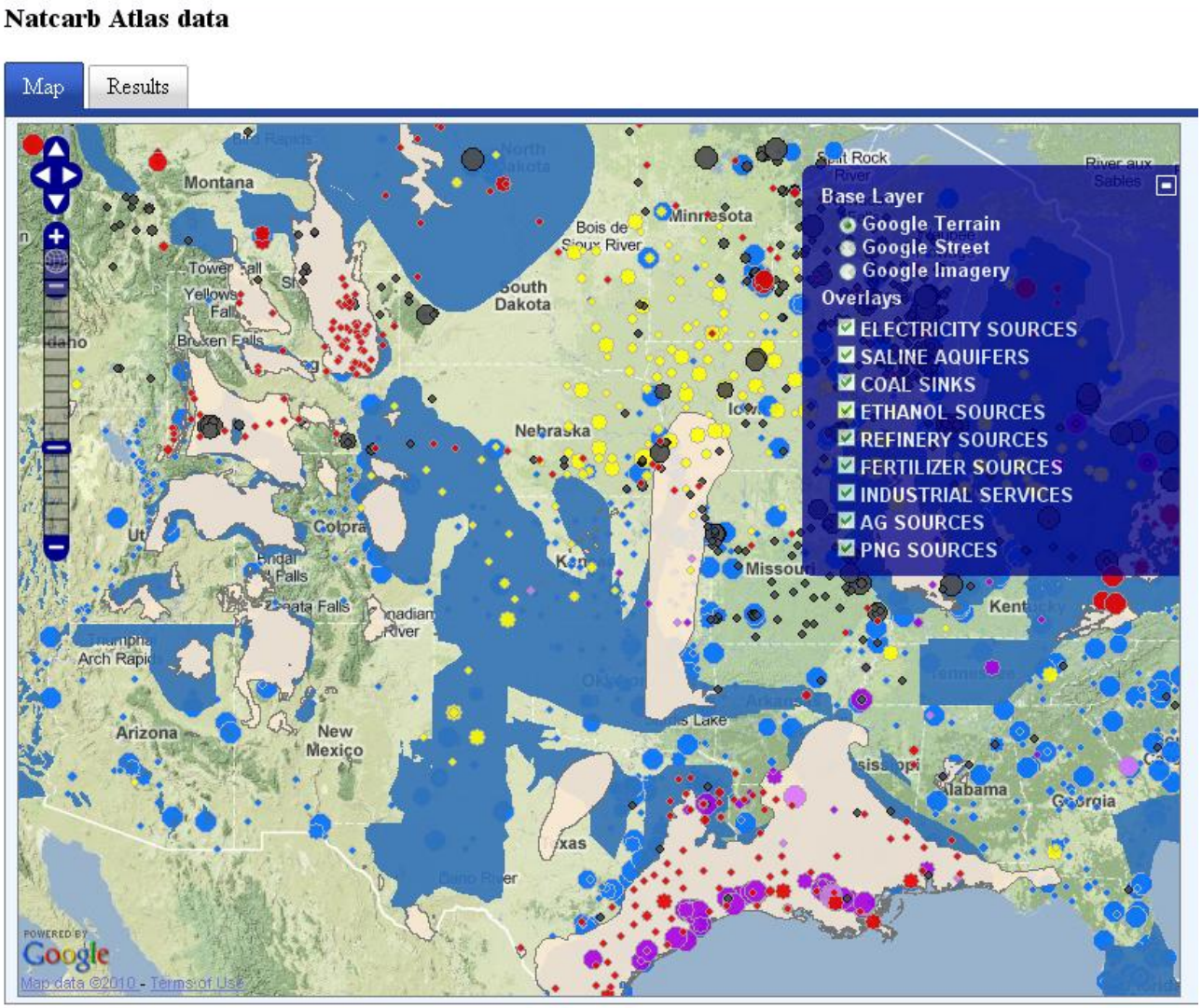




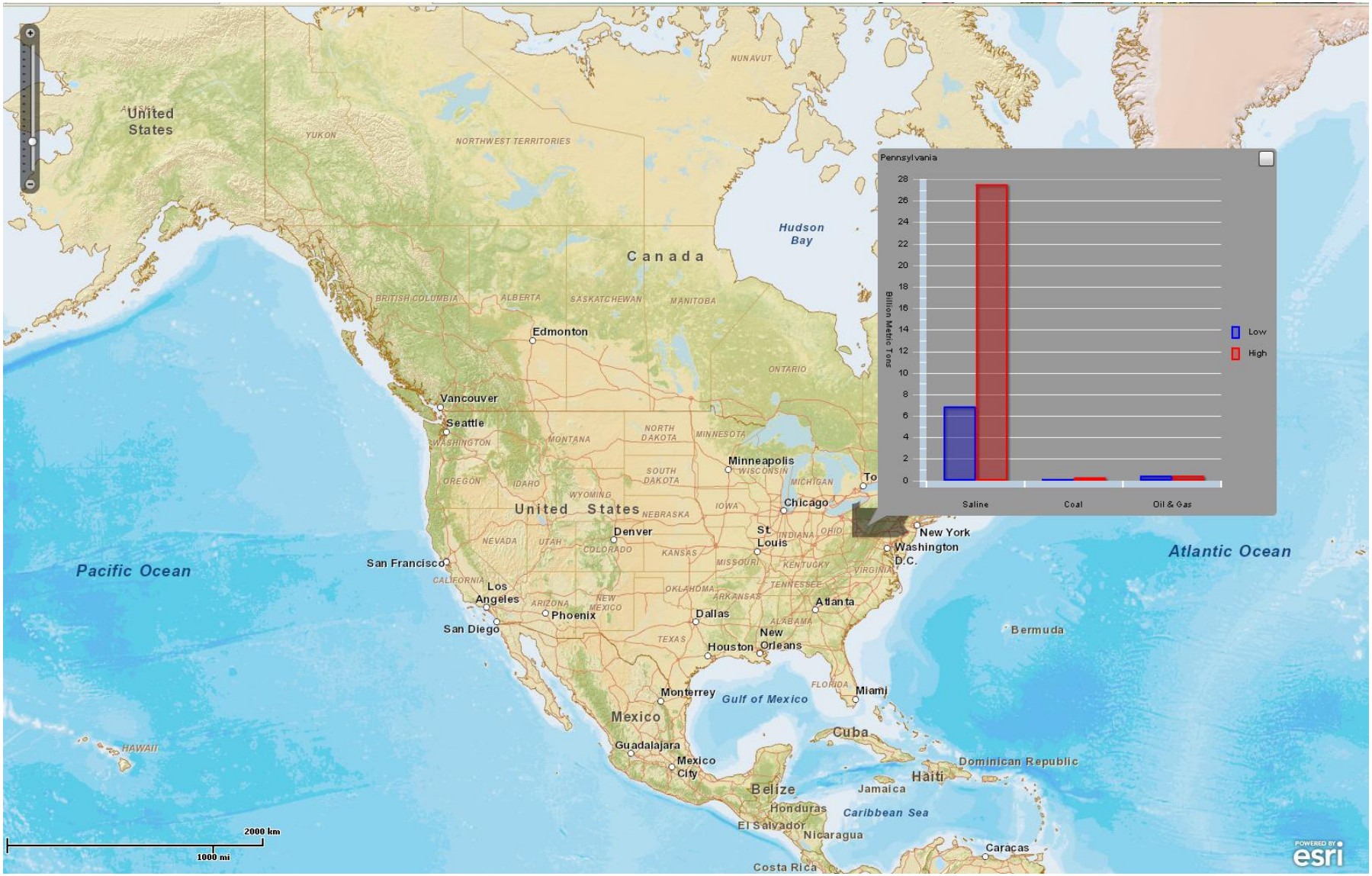
New ArcGIS Server Viewer



New NatCarb Google Maps Viewer

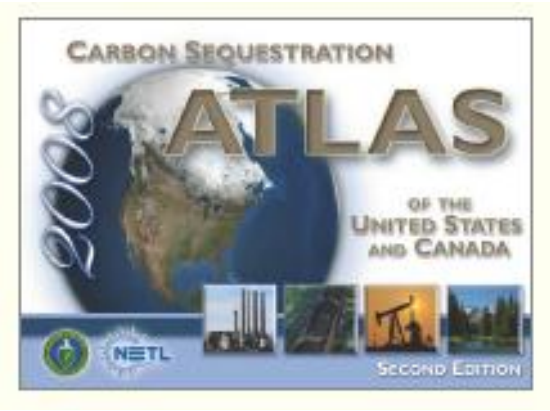


North American Carbon Storage Atlas



Developing Research Tools into NatCarb that Require Large-Scale and Region-Specific Data

Coal Seam $G_{CO_2} = AhC\rho E$ Saline Formation $G_{CO_2} = Ah\phi\rho E$



2008 CO_2 Capacity Estimates by Partnership				
	Unmineable Coal Seams		Saline Formations	
	Low	High	Low	High
	Billion Metric Tons of CO_2	Billion Metric Tons of CO_2	Billion Metric Tons of CO_2	Billion Metric Tons of CO_2
Big Sky	12.1	12.1	460.9	1,831.5
MGSC	1.7	2.4	29.2	116.6
MRCSP	0.8	0.8	49.6	199.1
PCOR	10.7	10.7	185.6	185.6
SECARB	43.8	63.0	2,274.6	9,098.4
SWP	0.7	1.8	92.4	368.9
WESTCARB	86.8	86.8	204.5	818.2
Total	157.0	178.0	3,297.0	12,618.0

Intergovernmental Panel on Climate Change, 2005

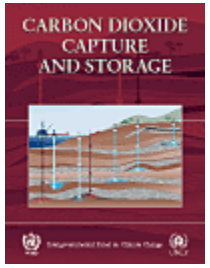


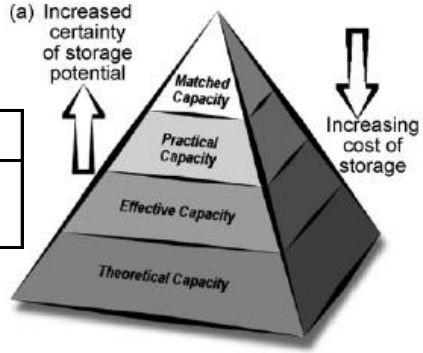
Table 5.2 Storage capacity for several geological storage options. The storage capacity includes storage options that are not economical.

Reservoir type	Lower estimate of storage capacity ($GtCO_2$)	Upper estimate of storage capacity ($GtCO_2$)
Oil and gas fields	675[a]	900[a]
Unminable coal seams (ECBM)	3-15	200
Deep saline formations	1000	Uncertain, but possibly 10^4

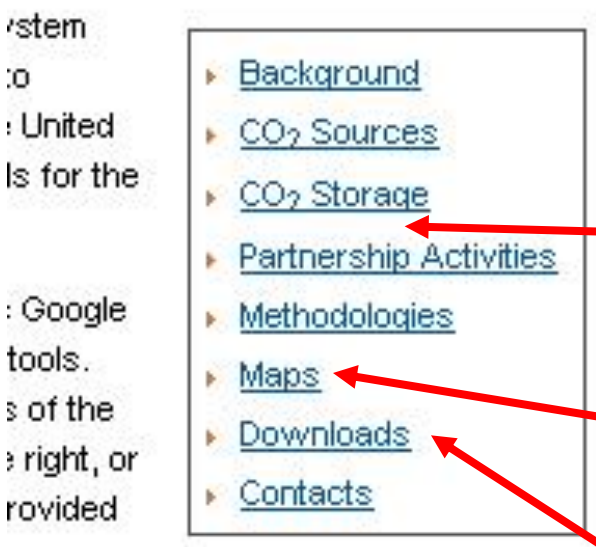
[a] These numbers would increase by 25% if "undiscovered" oil and gas fields were included in this assessment.

Uncertainty in Parameters

	A	h	ρ	C or ϕ	E	G_{CO2}	Goal
Unminable Coal Seams and Deep Saline Formations	?	?	?	?	?	?	+/- 30%



Incorporating Site Characterization Projects



- **Data can be accessed through NatCarb interface**
- **Organize data by site**
  - Background Information on Site Characterization projects can be included as independent NatCarb tab
  - Links to regional and site-specific GIS data with appropriate Metadata files as layers within NatCarb
  - Links to detailed data acquired as part of the DOE Site Characterization project
    - Well logs, 3D seismic, groundwater information, etc.
- **To organize and present data that will support regional projects and promote the Site Characterization program**